

# UniDev

The Evolving Role of Academic Institutions in Innovation Systems and Development

## The Evolving Role of Academic Institutions in the Knowledge Economy: The Case of Latvia

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## The Evolving Role of Academic Institutions in the Knowledge Economy: The Case of Latvia

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### 1. Introduction to the Latvian context

Latvia is a **transition economy**, which started its transformation from a centrally planned socialist economy to a liberal market economy in the late 1980s and the early 1990s. Moreover, in 1991 Latvia established its political independence from the Union of Soviet Socialist Republics (USSR), which also largely implied breaking the economic ties with the ex-Soviet economic structures in which the Latvian economy had been deeply integrated during the previous 50 years.

<b>Location:</b>	<i>North-East Europe, Eastern coast of the Baltic Sea</i>
<b>Area:</b>	<i>64,589 square kilometres</i>
<b>Population:</b>	<i>2,3 million (60% Latvians, 30% Russians)</i>
<b>Political system:</b>	<i>Parliamentary republic</i>

Similarly to other post-communist countries in Central and Eastern Europe (CEE), at the beginning of the transition period Latvia followed a neo-liberal **economic policy**, which emphasised privatisation, de-regulation and liberalisation.<sup>1</sup> After the breakdown of the socialist planned economy, the active role of the state in the economic development was discredited and a strong belief that the liberalisation of the market forces will lead to an economic prosperity prevailed. Later this attitude started to change as it became obvious that the market forces alone do not lead to the development of a knowledge-based economy. Moreover, in recent years integration in the European Union (EU)<sup>2</sup> has also pushed towards a more active role of the state as the allocation of the EU pre-structural and structural funds<sup>3</sup> is based on the rationale that the state can play a proactive role in the economic development through developing infrastructure and human resources as well as supporting entrepreneurial activities including research, technological development and innovation (RTDI).

**The economic performance** of Latvia recovered after the deep economic recession during the first years of transition. Since the second half of the 1990s the Latvian economy has experienced a steady growth, which has especially accelerated in the recent years.<sup>4</sup> Starting from year 2000, the average annual growth rate of gross domestic product has been 7.6% (*see Table 1*). In 2005 GDP increased even faster by 10.2%.<sup>5</sup> Economic growth has taken place in all sectors of the economy but in particular

<sup>1</sup> More on economic policies in transition countries in Central and Eastern Europe see *Journal of International Relations and Development* (2002), Vol.5, No 4, Special Issue "In Search of Growth Strategies: Innovation Policy in EU Accession Countries".

<sup>2</sup> Latvia became the Member State of the EU on 1 May 2004.

<sup>3</sup> Pre-structural funds (for candidate countries) and Structural Funds (for member states) are funds allocated by the European Union allowing national governments to grant financial assistance to resolve structural economic and social problems.

<sup>4</sup> If not indicated otherwise figures in this section are based on the following report: Ministry of Economics (June 2005) *Economic Development in Latvia*. Riga.

<sup>5</sup> Ministry of Economics (July 2006) *Economic Development in Latvia*. Riga.

in construction, trade, hotels and restaurants, manufacturing as well as transport and communications. At the same time, Latvia is still the poorest country among the European Union Member States. In 2004, its GDP per capita in Purchasing Power Standards (PPS) was only 43% of the EU-25 average. However, over the longer period of time a continuous catching-up process takes place. If in 1995 GDP per capita in PPS in Latvia was only 29.7% of the EU-25 average, then in 2006 it is expected to be 47.5%.<sup>6</sup> Similarly, despite the steady growth of labour productivity per person employed, in 2004, in Latvia it was still only 42.8% of the EU-25 average. The unemployment rate is continuously decreasing from 14.3% in 1998 to 9.8% in 2004, which is close to the EU-25 average (9%).

Recently Latvia has experienced a considerable increase in the **inflation** rate. While in 2000-2003 the average annual consumer price inflation in Latvia had been within a 2-3% range, in 2004 it reached 6.2%. This was one of the highest inflation rates in the EU-25 where the average inflation rate was 2.1%. While high rate of inflation remained in 2005 mostly due to increased world fuel prices and second-round inflation (spiral), it is forecasted that inflation will decrease gradually in the following years due to diminishing impact of the factors that are raising prices.<sup>7</sup>

**Table 1. Comparable indicators of economic performance**

Indicator	National performance		EU 25 average	
	2000	2004*	2000	2004*
GDP per capita in PPS (EU25=100)	35.5	43.7	100	100
Real GDP growth rate (% change previous year)	6.9	8.5	3.9	2.3
Labour productivity per person employed (EU25=100)	38.6	43.6	100	100
Total employment growth (annual % change)	-2.9	1.0*	1.4	0.2*
Inflation rate (average annual)	2.6	6.2	2.4	2.1
Unit labour costs (growth rate)	-6.5	1.1	0.4	-0.3*
Public balance (net borrowing/lending) as a % of GDP	-2.8	-0.8	0.8	-2.8*
Employment rate (as % of 15-64 population)	57.5	61.8*	62.4	63*
Unemployment rate (as % of active population)	13.7	9.8	8.6	9
Trade integration of goods ((imports+exports)/GDP)	33.8	37.6*	-	9*
Trade integration of services ((imports+exports)/GDP)	12.1	11.0*	-	3.2*
Foreign direct investment intensity	2.7	1.5*	-	1.2*
Business investment as a percentage of GDP	23.2	23.9	18.4	17.0

\* - or latest available year (2003)

Source: Kristapsons, J., Adamsone-Fiskovica, A. (2005) *European TrendChart on Innovation: Annual Policy Trends and Appraisal Report for Latvia*. European Commission, Enterprise Directorate-General, p.13.

Moreover, there are considerable **regional disparities** in the economic development. While according to the NUTS<sup>8</sup> criteria Latvia is considered to be as single region, it is divided into 5 planning regions – Zemgale, Vidzeme, Kurzeme, Latgale, and Lielriga (the capital Riga and the surrounding area). While the distribution of the population in the first 4 planning regions is around 15% in each, the rest 40% reside in the capital of Latvia. Inhabited by 48% of the total population, the capital city (Riga) and its surroundings produce 68% of GDP. In 2002, GDP per capita in the capital city was 182% of the national average, while in the surroundings of the capital city it was 66% of the national

<sup>6</sup> Eurostat <http://epp.eurostat.cec.eu.int>

<sup>7</sup> Ministry of Economics (July 2006), op. cit.

<sup>8</sup> European Union Nomenclature of Units for Territorial Statistics.

average, in the western region Kurzeme – 83%, in the north-east region Vidzeme – 58%, in the central region Zemgale – 56, but in the poorest eastern region Latgale – 48% of the national average.

The economy is dominated by **service sectors**. In 2004, service sectors made up 72.7% of GDP (by value added). The main service sectors are commercial services (22.2% of GDP by value added), trade, hotels and restaurants (19.8%), transport and communications (15.7%) and public services (15%). The industrial sector is rather weak. In 2004, the share of manufacturing in GDP structure by value added was only 14%. However, modernisation and reconstruction of production as well as utilisation of EU funds is expected to raise productivity and competitiveness of the manufacturing sector, therefore it is expected that industry will continue developing dynamically.<sup>9</sup> Primary sectors made up 4.5% of GDP by value added.

The structure of the economy in terms of **employment** is very much different from the structure by added value due to a great difference between the productivity levels in various sectors of the economy. By the number of employees, the main sectors in 2003 were public services (21.1% of total employment), trade, hotels and restaurants (17.3%), manufacturing (15.9%), commercial services (13.4%) and primary sectors (12.9%). On the whole the economic activity of the population (participation in the labour market) in Latvia is close to the EU average, while the economic activity of women has already exceeded the average indicators of the EU.

The structure of commodity **exports** in Latvia is dominated by low- and medium-tech sectors. In 2004, 30.5% of commodity exports were wood and wood products, 14.2% - metals and metal products, 11.4% - light industry products, 9.7% - agricultural and food products, 7.9% - products of chemical industry and plastics, 7.9% - machinery, 5.3% - mineral products, 2.5% - transport vehicles and 10.7% - other products. In 2003, only 4% of manufactured exports were high-technology exports.<sup>10</sup> Most of the Latvian exports go to the Western Europe. In 2004, 54% of exports went to EU-15, 18% - to Lithuania and Estonia, 12% - to the Commonwealth of Independent States (CIS) and 16% - to other countries. Although both exports and imports are growing, the external trade balance is negative. The current account deficit in 2004 was 12.3% of GDP.

In many transition economies, an important factor in the economic development and technology transfer has been **Foreign Direct Investment (FDI)**. However, Latvia has been one of the least successful among the transition economies in attracting FDI. Most of FDI in Latvia has been made in service sectors: commercial services (20% of the total FDI stock in Latvia), finances (17%), trade (17%), transport (8%), communications (8%), energy (8%) and other sectors (7%). Only 15% of FDI went to manufacturing. Moreover, FDI in manufacturing has been mainly made into low- and medium-tech sectors. Only a few so-called green-field projects, involving the introduction of new and modern technologies, have been implemented in Latvia.

The main comparative advantages of Latvia for attracting FDI are low labour costs and corporate tax rates. In 2003, Latvia had the lowest hourly labour cost in the EU-25. It was only 2.37 euros against the EU-25 average of 20.95 euros. However, the labour costs in Latvia are increasing, as in 1997 these made up only 1.59 euros per hour.<sup>11</sup> Latvia

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<sup>9</sup> Ministry of Economics (July 2006), op cit.

<sup>10</sup> World Bank (2005) *World Development Report 2006*.

<sup>11</sup> Eurostat <http://epp.eurostat.cec.eu.int>

has also one of the lowest tax rates on corporate income in the EU-25. In 2005, an effective top statutory tax rate on corporate income was 15% against the average 26.3% in the EU-25.<sup>12</sup> In order to promote sustainable economic development, the Ministry of Economics is planning to develop infrastructure, to invest in education and undertake other activities to attract FDI in knowledge-based and high-tech sectors.

The Latvian economy is dominated by **small and medium sized enterprises** (SMEs). In 2005, more than 99% of economically active enterprises fell in the category of SME. The level of business activity in Latvia is lower than in the EU on average. Although the number of newly established enterprises is constantly growing, the number of enterprises per 1000 population in Latvia still falls behind the EU average. In Latvia, it is 44, while in the EU – 55.<sup>13</sup>

According to the **European Innovation Scoreboard 2005**<sup>14</sup>, Latvia is lagging behind in terms of innovativeness. The EIS 2005 ranked Latvia 24<sup>th</sup> out of the EU 25 Member States (followed only by Malta). Latvia is particularly lagging behind on R&D expenditures and innovation output indicators: exports of high-technology products, employment in medium-high/high-tech manufacturing, patents, trademarks and industrial designs (*see Table 2*).

**Table 2. European Innovation Scoreboard 2005 - selected indicators**<sup>15</sup>

Indicator	EU 25	Latvia
New S&E graduates per 1000 population aged 20-29	12.2	8.6
Population with tertiary education per 100 population aged 25-64	21.9	20.0
Broadband penetration rate (number of broadband lines per 100 population)	6.5	1.5
Participation in life-long learning per 100 population aged 25-64	9.9	9.1
Youth education attainment level (% of population aged 20-24 having completed at least upper secondary education)	76.7	76.9
Public R&D expenditures (% of GDP)	0.69	0.25
Business R&D expenditures (% of GDP)	1.26	0.14
ICT expenditures (% of GDP)	6.4	7.6
Employment in high-tech services (% of total workforce)	3.19	2.31
Exports of high technology products as a share of total exports	17.8	2.7
Employment in medium-high/high-tech manufacturing (% of total workforce)	6.60	1.85
EPO patents per million population	133.6	6.0
USPTO patents per million population	59.9	0.3
Triad patents per million population	22.3	1.1
Community trademarks per million population	87.2	3.0
Community industrial designs per million population	84.0	5.2

Source: European Commission (2005) *European Innovation Scoreboard*.

As Latvia does not have rich natural resources, the need to develop a knowledge-based economy, to invest in research and education and to foster the creation and development of innovative enterprises is widely recognized. Nevertheless, one of the main problems for innovation in Latvia has been the low level of **R&D expenditure**. In 2004, the total gross domestic expenditure on R&D (GERD) in Latvia was 0.42% of GDP, while for the

<sup>12</sup> Eurostat news release 134/2005, 21 October 2005 (<http://europe.eu.int/comm/eurostat/>)

<sup>13</sup> Dumina, Z. (2006) "More SMEs would facilitate fall in prices". - *Diena*, January 13 (in Latvian).

<sup>14</sup> Available at <http://www.trendchart.org/scoreboards/scoreboard2005/pdf/EIS%202005.pdf>

<sup>15</sup> Only those indicators from the European Innovation Scoreboard 2005 are included in the table for which comparable data on the EU-25 and Latvia exist.

EU-25 average it was almost five times higher – 1.9% of GDP<sup>16</sup>. In Latvia, a relatively higher share of GERD is financed by the government. In 2003, almost half (46.4%) of GERD was financed by the government, while in the EU-25 government contributes approximately one third (34.9%) of GERD. Respectively, the contribution of industry in Latvia is relatively lower. In 2003, 33.2% of GERD in Latvia was financed by industry, while in the EU-25 – 54.3%. In Latvia, a rather high share of GERD is financed from abroad. In 2003, 20.4% (in 2002 – even 35.6%) of GERD was financed from abroad, while in the EU-25 – 8.5%. In 2005 the total financing for scientific research increased to 0.57% of GDP demonstrating a positive upward trend.<sup>17</sup>

Although the performance of Latvia is improving on a majority of innovation indicators, according to a simple linear extrapolation of its current performances and growth rates, it is estimated that it will take almost 40 years for Latvia to reach the EU-25 average in innovation performance under the current conditions<sup>18</sup>. For comparison, it is expected that the other new Member States Hungary and Slovenia will reach the EU average in 10 years, Lithuania – in a little more than 20 years, while Slovakia, Poland and Malta – in more than 50 years.

## 2. The Position of Academic Institutions in the National Innovation System of Latvia

### 2.1. Evolution of the national innovation system in Latvia

The national innovation system (NIS) in Latvia is still under formation having experienced only a comparatively recent upsurge since the late 1990s. From the socialist period Latvia inherited a Science and Technology system (S&TS), which had many similarities with other communist countries and especially with other republics of the Soviet Union.<sup>19</sup>

The **socialist science and technology system** evolved as a hierarchically structured and politically governed system based on the linear model of innovation reflecting the institutional separation of R&D whereby innovation was separated from production and the market. Under socialism, R&D activities were organised into three distinct and sharply separated sectors, namely, academies, universities, and ‘branch’ sectors, based on the general principles of central planning, namely, specialisation,

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<sup>16</sup> Data on GERD is from Eurostat <http://eurostat.cec.eu.int>

<sup>17</sup> *Report on Progress in Implementation of the National Lisbon Programme of Latvia for 2005-2008*. October 2006.

<sup>18</sup> European Commission (2005) *European Innovation Scoreboard*.

<sup>19</sup> General description of the socialist S&T system is based on Meske, W. (Ed.) (2004) *From System Transformation to European Integration: Science and technology in Central and Eastern Europe at the beginning of the 21<sup>st</sup> century*. LIT VERLAG Münster; Hirschhausen, C. von, Bitzer, J. (eds.) (2000) *The Globalisation of Industry and Innovation in Eastern Europe: From Post-socialist Restructuring to International Competitiveness*. Edward Elgar; Etkowitz, H. (2000) “Technology transfer and the East European transition”. - *Science and Public Policy*, Vol. 27, No 4, pp. 230-234; Radosevic, S. (1999) “Transformation of science and technology systems into systems of innovation in Central and Eastern Europe: the emerging patterns and determinants”. - *Structural Change and Economic Dynamics* 10, pp. 277-320; Meske, W., Mosoni-Fried, J., Etkowitz, H., Nesvetailov, G. (eds.) (1998) *Transforming Science and Technology Systems – the Endless Transition?* NATO Science Series 4: Science and Technology Policy, Vol. 23. Amsterdam: IOS Press; Balazs K., Faulkner W., Schimank, U. (eds.) (1995) *The Research System in Post-Communist Central and Eastern Europe*. - *Social Studies of Science*, Vol. 25, No 4. EASST Special Issue.

rationalisation and centralisation. Under the existing institutional framework, universities were primary training bodies, while basic research was carried out in the academies of science, with applied research and product development being the prime task of branch institutes and special design offices. Production was also separated from the former activities and was solely undertaken by industry, which in turn had no relation to research with non-existent in-house R&D activities in enterprises. There was no feedback from the final users as well as strong administrative barriers between the individual industrial branches that hindered technology diffusion and transfer between them. Networking under the socialist regime was mainly constructed and managed on a formal level by the state authorities, and links between domestic users and producers as well as between foreign and domestic sellers were weak. This was, of course, a rather artificial division and was accordingly transformed following the breakdown of the socialist system. However, lack of interaction between these units and their former fragmentation now forms one of the basic problems for establishing a well operating interactive innovation model. Though formally channelled contacts were unofficially supplemented by informal links, many of the latter were broken or vanished in the reform process.

The interrelations of actors involved in the innovation process and their particular functions have been, and still are, undergoing certain changes and alterations. The new division of tasks in the innovation process has also led to the loss of functions for different actors of the former S&TS. While under socialism all relevant functions were taken over by the state, the introduction of capitalism as an economic principle was marked by a shift of many of these functions from the state to the private sector. However, it must be noted that in regard to S&T issues this shift has been very gradual, since after the collapse of the USSR the newly established governments left S&T policy without proper attention. Initially, they were concerned with more urgent matters in the social and economic policy with limited comprehension of the potential role of R&D in the revival of the economy.

The abrupt change experienced by post-socialist countries is seen as a technology trajectory change or a paradigm shift in the S&T field, due to the marked differences in both the perception of innovation per se and the actor interplay and role division – a change from top-down to bottom-up approaches. While the former socialist S&TS was characterised by an overarching role of the state, fully secured government funding and decision making on merely political rather than monetary bases, the emerging **post-socialist innovation system** implies private initiative, market mechanism operation, and monetary constraints. Naturally, this major change and the current shift to the knowledge-based economy couldn't be realised on the spot, since the preconditions existing in the west were not present in post-socialist countries. Although legacies from the socialist period in Latvia left strong capacities in some areas of basic science, they also presented major challenges for building up a new national innovation system, e.g., reorientation of military R&D capacities to civilian sectors, considerable cuts in the government R&D expenditures, which have to be replaced by private funding and integration of universities and research institutes.

Altogether after restoration of its independence Latvia took a rather radical and revolutionary approach to the **R&D system reform**.<sup>20</sup> In 1989-1990, a new system of

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<sup>20</sup> Kristapsons, J., Martinson, H., Dageyte, I. (2003) *Baltic R&D Systems in Transition: Experiences and Future Prospects*. Riga: Zinatne, pp.39-40.

funding and management of science was established in Latvia. Direct funding of scientific institutions was replaced by financing of selected projects through grants. The state budget of Latvia allots a specific amount for research projects, market-oriented science, and for research contracts from ministries. The Council of Science distributes funding earmarked for projects among the branch commissions of different science fields. According to the new system scientific institutes, as organisations, received no funding from the state budget in Latvia. The necessary resources for the general maintenance of their institutes were obtained as overhead percentages of each received grant.

As to bridging the former divide between universities and the research establishments, in 1997-1998, the bulk of the former academy institutes in Latvia were integrated into the universities, while the remaining institutes became public or state institutes or formed independent scientific centres.<sup>21</sup> During the last years altogether 20 state research institutes and their staff have been involved in universities with the primary aim of modernizing and strengthening the research capacity of these universities and the quality of study programmes.<sup>22</sup> This integration and incorporation of research institutes included participation of institutes at all levels of higher education, participation of scientists from institutes in competition for academic positions at universities, restructuring of faculties, and re-assessment of accreditation criteria for study programmes. Reorganisation of state research institutes was completed in 2006 by integrating them in the University of Latvia (8 institutes), Riga Technical University (1 institute) and Riga Stradins University (1 institute).<sup>23</sup> The following state science institutes with the status of state agencies were formed: Latvian Institute of Organic Synthesis, BioMedical Research and Study Centre, Latvian State Institute of Wood Chemistry, Institute of Hydroecology, Institute of Physical Energetics, Institute of Electronics and Computer Science, Latvian Forestry Research Institute Silava. At the present time, the majority of state research institutes have transformed their legal status and are now formally incorporated into the universities, however, fully functional integration is still a matter of time and subject to financial and managerial stimuli.<sup>24</sup> The state research institutes not integrated into the university system remain or become national research centres (centres of excellence).

## ***2.2. Characteristics and assessment of the newly emerging system***

There is quite a broad range of organisations involved in the national innovation system in Latvia - the actors are both public and private sector representatives either directly or indirectly involved in the innovation policymaking, its implementation, as well as ideological and/or practical promotion of innovations in Latvia.<sup>25</sup> These organisations are to various degrees linked with each other through consultancy, partnerships, shared functions, or collaboration, nevertheless, many studies point to the comparatively underdeveloped linkages and co-operation between the various stakeholders.

In the context of system transformation and in the development of an efficient innovation system the role of the **government** and state policy both in regard to science

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<sup>21</sup> Kristapsons et al (2003), op cit.

<sup>22</sup> *R&D in Latvia* (2005) 3<sup>rd</sup>, revised edition. Ministry of Education and Science. Riga. pp. 21-22.

<sup>23</sup> *Report on Progress in Implementation of the National Lisbon Programme of Latvia for 2005-2008*. October 2006.

<sup>24</sup> *R&D in Latvia* (2005), op cit.

<sup>25</sup> Kristapsons, J., Adamsonė-Fiskovica, A. (2005) *European TrendChart on Innovation: Annual Policy Trends and Appraisal Report for Latvia*. European Commission, Enterprise Directorate-General, p. 3.

as well as more generally to innovation is of particular importance in Latvia. Two major governmental bodies involved in the NIS are the Ministry of Education and Science and the Ministry of Economics. In more concrete departmental terms the main ones are the Department of Higher Education and Science at the Ministry of Education and Science established already in the early 1990s (as of September 2006 a new Department of Science, Technologies and Innovations has been formed at the Ministry) and the Innovation division established at the Industry Department of the Ministry of Economics in 2003. The latter is a government body responsible for the development and co-ordination of innovation policy in Latvia. Recently a more proactive role is taken also by the Ministry of Regional Development and Local Government. So far an important role was also played by the Latvian Council of Science established in 1990 and charged with the task of advancement, evaluation, financing and coordination of scientific research in Latvia. Yet currently part of the functions of the Council are being taken over by the Ministry of Education and Science itself and such intended management structures as the Agency of higher education and science. Other bodies involved in the governance of the academic system include the Latvian Academy of Sciences, the Council of Higher Education, the Board of Rectors, the Union of Scientists.

The **industrial system** is mainly represented by small and medium sized companies with a comparatively small share of large companies. The enterprise sector embodies one of the major weaknesses of the NIS due to its weak innovative capacities especially in respect to SMEs.<sup>26</sup> According to the results of the Community Innovation Survey in 2001-2003, only 18.6% of enterprises in Latvia have conducted innovative activities.<sup>27</sup> In 2003, more than half of the total innovation expenditure was spent on machinery and equipment acquisition and only about 10% of the total innovation expenditure was spent on R&D. At 81%, Latvia has the highest share of non-innovative firms in the EU.<sup>28</sup> The low innovation capacity of companies is explained by the lack of such elements as a basic management competence, an insight on internal barriers to growth, knowledge of the innovation-supporting resources available as well as collaborative relations with external partners.<sup>29</sup> While innovative companies mention the lack of sources of finance, too high innovation costs, too high imputed economic risk, lack of qualified personnel, and organisational rigidities among the factors hampering innovation, non-innovative ones point to the lack of the need for innovation due to market conditions and prior innovations.<sup>30</sup>

**Innovation and business support organisations** form an expanding element of the NIS of Latvia with an increasing number of industrial parks, technology centres, risk capital funds, consulting companies and various other intermediaries. Many of those are a rather novel phenomena in Latvia that are expected to strengthen the enterprise sector by assisting established companies as well as encouraging formation of start-ups and new technology based companies thereby boosting the comparatively low entrepreneurial

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<sup>26</sup> Watkins, A., Agapitova, N. (2002) *Creating a 21st Century National Innovation System for a 21st Century Latvian Economy*. World Bank.

<sup>27</sup> Central Statistical Bureau of Latvia (2005) *Research and Development and Innovation Statistics*. Statistical Data Collection. Riga.

<sup>28</sup> Arundel, A., Hollanders, H. (2005) "Innovation Strengths and Weaknesses". Available at [www.trendchart.org](http://www.trendchart.org)

<sup>29</sup> RIS Latvia (2004) *The Latvian Innovation System: Strategy and Action Plan 2005-2010*. Riga. pp. 9-15.

<sup>30</sup> Central Statistical Bureau of Latvia (2005), op cit. p.17.

activity. Nevertheless, it is noted that for the time being innovation-service suppliers lack needs-orientation with the service sector being reactive, lacking specialisation and innovativeness and not being able to deliver holistic service due to sector isolation within innovation support.<sup>31</sup> In respect to financial support many SMEs are not aware of the available support schemes and even fewer use them.<sup>32</sup> There is also a lack of appropriate financial instruments to support an innovation-based growth as well as a lack of competence among financiers. Venture Capital activities are underdeveloped.

The **academic institutions** represented by higher education establishments and research institutes make up an essential element of the system with their major contribution made in the provision of human capital and undertaking research. Their role in the NIS is becoming even more pronounced with an expanding focus on the need of shifting from a purely educational function of the HEEs to that of research as well as entrepreneurship thus bridging the former gap and making the necessary link with the other elements of the system, especially industry. While the strong points of the NIS are said to be the highly skilled scientists and specialists as well as the consistent interest of youth in obtaining higher education, such weaknesses as a marked discrepancy between the employers' demand for qualified staff and the capability of the educational system to train the required specialists, the weak development of research, the lack of balance between education and development of modern technologies (innovation) and their implementation as well as threats related to the stagnation of education, science and research are being stressed.<sup>33</sup> Although the higher education system of Latvia has been experiencing rapid and profound changes with significant progress achieved in reforming and modernizing HE, the new challenges faced by the HEEs, the governing bodies of the HE system, and the society at large include the relevance of HE for the national development, quality of teaching, institutional organisation of HE (need for an improved provision of the physical/teaching/management infrastructures and means), capacity to produce and disseminate innovations, funding mechanisms as well as governance and coordination.<sup>34</sup> The R&D capacity is still characterised by low needs-orientation of applied research, low transfer competence of R&D institutions as well as lack of incentives and entrepreneurial culture.<sup>35</sup> Difficulties in building the linkages between R&D organisations and enterprise sector arise also due to the often asymmetrical relationships between the sometimes highly sophisticated R&D skills in the science sector on the one hand and the weak enterprise sector with underdeveloped innovative capacities on the other hand. Currently, there are also limited incentives for researchers to work with companies since the academic merit system favours academic achievement, not industrial experience.<sup>36</sup> This, combined with the fact that R&D institutions form a closed system, virtually isolated from the outside world in terms of the exchange of personnel, contributes strongly to the lack of needs-orientation of services, and the lack of understanding of how to work with companies. Thus the enterprise sector and the R&D

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<sup>31</sup> RIS Latvia (2004), op.cit.

<sup>32</sup> RIS Latvia (2004), op.cit.

<sup>33</sup> BDO Invest Riga (2002) *Scientific Study for Elaboration of the National Programme on Innovation*. Riga.

<sup>34</sup> Brunner, J. J. (2003) *Latvia. Higher Education: Changing Conditions, Problems, Challenges and Policy Options*. World Bank.

<sup>35</sup> RIS Latvia (2004), op.cit.

<sup>36</sup> RIS Latvia (2004), op cit, pp.11-12.

sector are said to be developing in total isolation from each other with the rare occasions of innovations having practically no connection with the output or technical capacity of the domestic R&D system and the needs of industry.<sup>37</sup>

In more general terms the strong points for Latvia include the marked geographical advantages, economic stability and growth, while the weaknesses lie in the pronounced unevenness of the socio-economic development among the territories of Latvia, lack of funding and an underdeveloped normative environment conducive to innovation.<sup>38</sup> The desirable progress is hampered by the weak industry and the SME system. While Latvia is in a position to use the opportunities offered by its accession to the EU and integration into the European Research Area as well as implementation of all the planned innovation policy measures, its future advancement is still threatened by a possible slowdown and uneven distribution of the current pace of development as well as inability to achieve and sustain a sufficient level of competitiveness on the international scene.<sup>39</sup>

### **2.3. Policy developments**

After major changes in the political and economic system in the early 1990s, a new basis for **research policy** was provided by the law *On Research Activity* adopted by the Parliament in 1992. This law defined the status of a scientist and the structure for funding and governance of science. Afterwards the scientific community and administrators of research policy developed several drafts for strategic policy documents, which did not succeed to get political support. This negligence of innovation issues during the 1990s can also be seen in the declarations of the Latvian governments, which define the main goals and intended activities of the Cabinets of Ministers.<sup>40</sup> In the declarations of the 1990s with regards to RTDI mainly two issues are briefly mentioned: firstly, the need to integrate science in the higher education and, secondly, the need to set clear priority areas for science. The *Guidelines for the development of higher education, science and technology for 2002-2010* – a strategic document setting out a strategic aim to improve higher education, science and technologies as the basis for the long-term development of civil society, economy and culture was only taken into consideration. It should be noted that one of the main tasks envisaged by the guidelines was related to strengthening the leading role of universities in the development of higher education and science by establishing universities as the main science centres in Latvia uniting high level research activities with high quality academic and professional studies in a wide range of thematic fields. From time to time also some other science- and innovation-related issues have appeared on the political agenda, e.g., the development of science-based industry and stopping of brain drain or the need to increase funding. However, no measures were taken to implement these promises at that time.

A certain shift has occurred only in the recent years with a more economically oriented **innovation policy** being developed in Latvia. The process started in the late

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<sup>37</sup> Watkins, A., Agapitova, N. (2002), op cit.

<sup>38</sup> BDO Invest Riga (2002) *Scientific Study for Elaboration of the National Programme on Innovation*. Riga.

<sup>39</sup> Kristapsons, J., Adamsons-Fiskovica, A. (2004) *European TrendChart on Innovation: Annual Policy Trends and Appraisal Report for Latvia*. European Commission, Enterprise Directorate-General, p. i.

<sup>40</sup> The Declarations on Intended Activities of the Cabinets of Ministers (in Latvian) are available at [www.mk.gov.lv](http://www.mk.gov.lv)

1990s when a small innovation policy community came together to develop first draft documents on innovation. The Cabinet of Ministers approved the *National Concept Paper on Innovation Policy* in 2001 and the *National Programme on Innovation for 2003-2006* (NPI) was approved in 2003. The NPI is the basic innovation policy document today with annual action plans elaborated for its implementation. Alongside the long- and medium-term goals the short-term objectives of the programme are related to commencing the coordination and improvement of the innovation system, promoting the interest of society in the practical use of knowledge in business, as well as a successful development of education, science, research and innovations. Among other policy documents addressing R&D issues one should mention the *Long-term Economic Strategy of Latvia* adopted in 2001, which outlines the model of developing a knowledge-based economy in Latvia. The necessary shift from a labour-intensive to knowledge-intensive economy is also stressed by the *Single Economic Strategy of Latvia* adopted by the Cabinet of Ministers in 2004.

The most recent years (**2005-2006**) in this respect have been marked by two core documents. The *National Lisbon Programme of Latvia for 2005-2008* elaborated by the Ministry of Economics and approved in the end of 2005 points out five main economic policy directions for reaching the Lisbon goals<sup>41</sup> in Latvia, incl. stimulation of knowledge and innovation as well as improving education and skills. More concrete measures address the renewal of intellectual potential in science, modernization of scientific infrastructure in research institutes and HEEs as well as promotion of transfer of knowledge and technologies in production, strengthening cooperation between public administration institutions, education establishments and employers in order to adjust the supply of the education system with the needs of the labour market, rising the cost-efficiency and improving availability of education at all levels, etc. The programme stresses the importance of strengthening the leading role of HEEs in the development of science and research. In the beginning of 2006 the European Commission gave a positive evaluation of the programme along with an indication to specify the planned measures for reaching the aims set in a range of spheres, incl. that of R&D.

Closely related to the above-mentioned programme is the *National Development Plan of Latvia for 2007-2013* elaborated by the Ministry of Regional Development and Local Government in cooperation with other ministries, experts and social partners and approved by the Cabinet of Ministers on 4 July 2006. This plan outlines the routes of strategic development and priorities of Latvia for the coming planning period of the EU fund absorption, envisaging the future development of Latvia based on the application of science and modern technologies in the economy and radical growth of educational system for the provision of skilled and competitive human resources along with positive changes in the regional development. Due to its comprehensiveness and the stress laid on education, science and technology various experts see this document as a revolutionary turn in the development of the country provided that its aims are backed up by financial

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<sup>41</sup> The Lisbon Strategy, also known as the Lisbon Agenda or Lisbon Process, is an action and development plan for the European Union. It was set out by the European Council in Lisbon on March 2000. According to this strategy the EU set itself a new strategic goal for the next decade to become the most competitive and dynamic knowledge-based economy in the world, capable of sustainable economic growth with more and better jobs and greater social cohesion by 2010. It was relaunched as the "Community Lisbon programme" in 2005 with the new focus on growth and employment. Subsequently each Member State had to elaborate its national reform plan in meeting the set goals.

resources and concrete implementation instruments – a problem so far typical for the various policy planning documents in Latvia.

Aside from these strategic policy documents several **laws** specifically governing higher education and research in Latvia should be mentioned as well. The *Law on Higher Education Establishments* (1995, amended in 2000) regulates the status, the rights and tasks, the establishment and reorganisation, the accreditation, the juridical basement, the international co-operation of HEEs; the economical and research actions in HEEs; the rights and obligations, the terms and enrolment of students; the study programmes, the status, rights and obligations of the Council of Higher Education. Though the law currently in force has been amended several times it has become out-of-date since HEEs and the overall system of higher education have also developed over the last decade.<sup>42</sup> Therefore in the second half of 2005, the Ministry of Education and Science elaborated a new draft *Law on Higher Education*. Its main emphasis is on the regulation of the processes (study content and programmes, courses, modules), procedures (accreditation, licensing, registration) and outcomes (academic degrees and qualifications) rather than the organisational structure of HEEs. The new draft law no longer envisages the artificial division of education and study programmes into academic and professional ones. It provides a substantially improved management system of HEEs largely separating the academic issues of HEEs from economic, financial and administrative ones. It also proposes a new administrative body - the Board of Higher education establishment - involving representatives of the HEE, employers and state administration with its composition approved by the Cabinet of Ministers. Essential changes apply also to the competition system of the elections of academic staff. This law is still undergoing the process of public consultation involving a wide range of stakeholders.

Last but no least, a new legal basis for research policy has been recently provided by the new law *On Research Activity*, which came into force in May 2005 replacing the one passed in 1992. This law includes an article on research activity at the HEEs, defines the unity of science and higher education, rights, responsibility, independence and academic freedom, professional and social guarantees of scientists, competency and obligations of public institutions in the provision of research activity. It also includes a provision that the scientist exclusively owns the intellectual property generated as a result of ones research activity unless provided otherwise in the contract. One of the key features of this law is the envisaged substantial increase in the state funding for research as well as the introduction of institutional funding for university research.

In recent years, support for research and innovation has become one of the governmental priorities. This can be seen in the Declaration of the previous Cabinet of Ministers which mentions enhancement of competitiveness and development of a knowledge based economy among the main political goals.<sup>43</sup> In the Declaration, the Cabinet committed itself to an annual increase in the public funding for science. The Declaration set out such activities as the development of financial assistance for innovative activities, promotion of scientific work in higher education establishments and financial incentives for involving young people in scientific work and obtaining degree in science. The Cabinet also admitted the need to increase the role of science in the

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<sup>42</sup> [www.izm.gov.lv](http://www.izm.gov.lv)

<sup>43</sup> Declaration of Intended Activities of the Cabinet of Ministers. December 1, 2004.  
<http://www.mk.gov.lv/index.php/en/?id=1286&page=1243>

industrial development by involving scientists in research leading to new competitive products with high added value and developing industrial production. These trends are expected to be followed-up also by the new government currently in the process of formation following the parliamentary elections on 7 October 2006.

Given these current developments an overall assessment of the implementation of R&D and innovation policy in Latvia shows a relatively successful development of the national innovation system as far as the government is concerned.<sup>44</sup> In recent years a range of main challenges has been identified and measures to address them have been defined. Although previously a marked deficiency of policy making was related to the lack of identification of funding sources and concrete financial allocations for the numerous strategies and named priorities, this tendency is gradually being eradicated. Nevertheless, meeting each and every policy target set by the government will not be an easy task even under favourable financial conditions given the long way Latvia still has to go in order to close the considerable gap in GDP per capita between itself and the EU average.

### 3. Mapping the Academic System in Latvia

#### 3.1. *Historical insight*

The development, fate and the established traditions of the academic system in Latvia have been largely conditioned by the complicated developments in the history of the nation in various periods being under the German, Polish, Swedish and Russian rule.

Due to the lack of natural resources Latvia has had to depend on its human resources since early ages. Some illustrative examples of the high level of **development of education** in Latvia include the fact that there was a project to establish the 3rd university of the Swedish kingdom in Riga in the 17th century, that Latvia was the most educated part of the Russian empire, that it was ranked the 2nd in terms of population education in Europe in 1938 (after Denmark) and that the high prestige of the doctoral thesis defended in Latvia upon awarding of doctoral degrees in the USSR lead to their automatic recognition in Moscow.

Schools providing Latvian-language **education** began to develop only in the wake of the Reformation, in the mid- to late 16<sup>th</sup> century.<sup>45</sup> Education saw rapid development in the 19<sup>th</sup> century and particularly in the years of the Latvian National Awakening in the second half of the century, when a stratum of Latvian intellectuals emerged and established itself. From 18 November 1918, with the foundation of an independent Latvian state, the titular nation gained the guaranteed right to obtain all forms of education in Latvian. In 1919, the idea of founding a national university, formulated already in the late 19<sup>th</sup> century, became a reality. On 28 September 1919 the University of Latvia began teaching. Overall, in the inter-war period (1918–1940) a modern, unified system of education developed in Latvia, consisting of primary education, secondary education, special secondary education, vocational education and higher education. In general terms, this structure of education is still retained today.

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<sup>44</sup> Kristapsons, J., Adamsone-Fiskovica, A. (2005), op cit, p. iii.

<sup>45</sup> Stradins, J. (1982) *Sketches on the history of Latvian science*. Riga: Zinatne (in Latvian).

As to **scientific activities**, Western European science and technology began to be introduced in present-day Latvia during the Age of Reformation in the 16<sup>th</sup> century.<sup>46</sup> Systematic research began here at the end of the 18<sup>th</sup> century. The Tartu University, re-established in 1802, was a joint centre of higher education and science for all three Baltic provinces of the time (present-day Latvia and Estonia), where the first Latvian intellectuals, including scientists, obtained their education. However, it was the Baltic Germans who played the leading role in the early development of science. Modernisation trends in Eastern Europe and the Russian Empire provided the stimulus for establishing the Riga Polytechnic in 1862. This higher education institution was the first polytechnical university in the Russian Empire. As noted earlier, the attainment of independence made it possible, in 1919, to establish the University of Latvia – the first broad-ranging university in the new state. Along with engineering, agriculture and chemistry, the University of Latvia also conducted research in the humanities, natural sciences, medicine and social sciences. In 1939, another higher education institution was established in Jelgava – the Academy of Agriculture, and the first attempts were made to establish a Latvian Academy of Sciences.

World War II, occupation and Latvia's annexation to the USSR, along with the deportations, was a crushing blow for Latvia's flourishing scientific activity.<sup>47</sup> 60% of pre-war scientists emigrated to the West, where many continued their research work. After World War II, science in Latvia developed within the USSR as a more or less anonymous constituent of "Soviet science". Research at universities and colleges declined, but an Academy of Sciences of the Latvian SSR was founded in 1946. The Academy of Sciences, with its 15 major institutes, conducted important research in physics (magnetohydrodynamics and solid state physics), astronomy, mechanics of composite materials, information science, chemistry (medical chemistry, chemistry of heterocyclic compounds, wood chemistry, low temperature plasma chemistry and electrochemistry), hydrobiology, virology and molecular biology.

In the Soviet R&D system, research in academy institutes was separated by departmental barriers from research carried out in universities.<sup>48</sup> Until 1946, universities contributed the core of research in the Baltic States. Formation of the Soviet-type academies of science destroyed this historically formed research system. Research was centred in the research institutes, and education was the focus for the universities. There was a marked separation of universities and science. In 1990, there were 33 specialized research institutes in Latvia, which worked in isolation from institutions of higher education.<sup>49</sup> This isolation did not augur well for the development of strong links between research and higher education. At that time, 30,000 people were employed in science (incl. 12 000 researchers, more than half at doctoral level). Although international acclaim was won in several fields of the exact and natural sciences, and although young and capable scientists emerged, this development was one-sided and geared to the needs of a great power, not those of a small country.<sup>50</sup> Besides, isolation from the West was felt

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<sup>46</sup> Ibid.

<sup>47</sup> Stradins, J. (1998) *Latvian Academy of Sciences – Origin, History, Transformation*. Riga: Zinatne (in Latvian).

<sup>48</sup> Kristapsons et. al. (2003), op. cit. pp. 52-55.

<sup>49</sup> *R&D in Latvia* (2005) 3<sup>rd</sup>, revised edition. Ministry of Education and Science. Riga. p. 21.

<sup>50</sup> Stradins, J. (2000) "Science in Latvia – trends, topics, traditions". In: *Academia Scientiarum Fennica*, pp. 109-119. Helsinki.

acutely. In the early 1990ties the Latvian Academy of Sciences has been transformed into a corporation of individual members on the Western European model, electing many new members from among scientists at home and abroad. The former research institutes have generally been incorporated into the University of Latvia, where they continue their work under the new conditions.

When Latvia regained its independence in 1991, the directions and scope of science changed, as did research priorities.<sup>51</sup> With the establishment of the Latvian Council of Science, the evaluation of research was based on internal competition – the standard of research and the productivity of researchers. In 1992, the Danish Research Councils performed an international assessment<sup>52</sup> of Latvian science, giving a positive evaluation of the level attained and formulating proposals for restructuring research. In 1997, upon request of the European Commission the company "Coopers&Lybrand" conducted an in-depth analysis of the management structure of Latvian R&D. One of the conclusions of this study was that the downscaling of R&D in Latvia, as in other CEEs, has decreased the practical capacity for scientific research. Nevertheless, science in Latvia seems to have survived as Latvia continues a high level participation in the international scientific community and is making very important contributions to the continuing development of science at large.<sup>53</sup>

### ***3.2. Current system of education and research***

Although there has been a move away from the strict separation of education and research the following sections are formally divided into these two components since integration of those is still in the process.

#### ***3.2.1. System and characteristics of higher education in Latvia***

In higher education programmes the state covers tuition fees for a certain number of students' places (~1/3), according to the State Procurement in the respective academic year.<sup>54</sup> Each HEE may set a tuition fee for the rest of students' places. All students are entitled to a state credit for their studies in any higher education programme.

**Academic higher education programmes** are based upon fundamental and/or applied science; they usually comprise a thesis at the end of each stage and lead to a Bachelor's degree and Master's degree. A bachelor's degree is awarded after three or four years of study, while a master's degree is obtained on successful completion of a second phase of academic higher education, lasting one or two years. Master's degree or the equivalent is required for admission to doctoral studies (Ph.D.). Doctoral studies last 3-4 full-time years. The procedure for award of doctoral degrees is determined by the Latvian Council of Science, which also appoints the Promotion Boards that are entitled to award doctoral degrees.

In 2005, there were 36 accredited **higher education establishments** in Latvia, most of which belong to the state (5 public universities and 15 public specialised universities and university colleges), the rest (16) having been founded by other legal

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<sup>51</sup> Ibid.

<sup>52</sup> The Danish Research Councils (1992) *Latvian Research: An International Evaluation*. Copenhagen.

<sup>53</sup> *R&D in Latvia* (2005), op cit, p.38.

<sup>54</sup> [www.izm.gov.lv](http://www.izm.gov.lv)

entities or private individuals.<sup>55</sup> The 5 public universities are the University of Latvia (founded in 1919), Riga Technical University (institute - 1862, university - 1990), Latvia University of Agriculture (1939), Riga Stradins University (institute - 1950, academy - 1990, university - 2002), and Daugavpils University (institute - 1921, university - 2000). Additionally there is an increasing number of private HEEs in Latvia, which all contribute to the comparatively high level of population with tertiary education (16%).

**Table 3. Characteristics of higher education sector – general indicators (2000-2005)**

	Total	of which	
		higher education institutions	R&D institutions under surveillance of higher education institutions
<i>Number of institutions</i>			
2000	49	28	21
2001	54	31	23
2002	53	29	24
2003	52	28	24
2004	50	28	22
2005	48	28	20
<i>Number of R&amp;D personnel (FTE)</i>			
2000	2156	1429	727
2001	2242	1489	753
2002	2226	1438	788
2003	2222	1441	781
2004	2385	1618	767
2005	2224	1487	737
<i>Expenditure on R&amp;D (thsd lats)</i>			
2000	7897	3104	4793
2001	8901	3516	5385
2002	9681	3727	5954
2003	10223	4302	5921
2004	11202	4267	6935
2005	20534	10983	9551

Source: Central Statistical Bureau of Latvia (2006) *Research and Development, and Innovation Statistics*. Riga. p.36.

Increase in the number of HEEs has also lead to a considerable increase in the number of **students** (at least threefold since the regaining of independence of Latvia) (*see Figure 1*). The total number of students in 2003/2004 was 127,000, while in 2005 it increased to 130,693. Yet, the number of students is very unevenly distributed among HEEs. The two biggest HEEs are the University of Latvia with 27,857 students and the Riga Technical University with 16,510 students. Approximately half of the HEEs have less than 1,000 students<sup>56</sup>. Resources and research are mainly concentrated in the biggest HEEs, while other ones are highly specialised HEEs (e.g., the Latvian Academy of Art or the Latvian Academy of Music) or perform mainly teaching activities.

In the academic year 2004/2005 there were 556 students per 1000 population, which rates the second in the world after Canada (580).<sup>57</sup> However, it should be noted

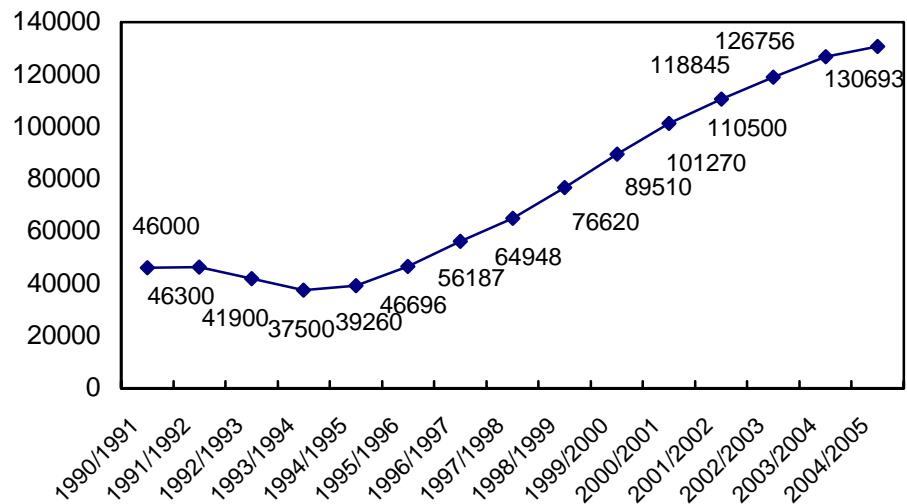
<sup>55</sup> Muiznieks, I. (2005b), op cit.

<sup>56</sup> Ministry of Education and Science (2004) *Report on higher education in Latvia in 2004 (figures, facts, trends)*. Department of Higher Education and Science. (in Latvian). pp.53-54.

<sup>57</sup> Ibid, p.94.

that HEEs are to a certain degree forced to take more students than it would be optimal for retaining the quality of teaching and for developing research activities due to the large dependence on the budget income mainly generated by student fees.<sup>58</sup> While the share of students in HEEs funded by public resources in 2004/2005 made up only 25%, the respective share funded by private ones was 75%.<sup>59</sup>

**Figure 1. Number of students in Latvia (1990/91-2004/5)**



Source: Ministry of Education and Science (2004) *Report on higher education in Latvia in 2004 (figures, facts, trends)*. Department of Higher Education and Science. (in Latvian). p.51.

As to the division of students by **fields of studies**, only a minor share of students are undertaking studies in engineering, mathematics and natural sciences with every 2<sup>nd</sup> student studying social sciences (see *Figure 2*). This thematic division has not experienced any substantial changes during the last years with slightly increasing share in favour of social sciences and humanities and a decreasing one in engineering, manufacturing and construction (from 20.5% in 1997/1998 to 9.2% in 2004) even despite the allocation of additional state financed study places in the latter study programmes.<sup>60</sup>

According to the division by **gender** there is a larger proportion of female students (60%) in Latvia with marked overrepresentation thereof in the study programmes of teacher training (84%), humanities (80%), health and social care (73%), as well as social sciences (64%).<sup>61</sup> The share of women makes up 63% of the total number of graduates (see *Figure 3*). In terms of academic staff at HEEs the share of females is 36% with only a negligible share in the total academic staff in the posts of Professor and Associate Professor. There is a decreasing share of female representatives

<sup>58</sup> Muiznieks, I. (2005a) "The future of universities and scientific activities". In: *Building knowledge society* (in Latvian). Riga: Zinatne. Pp. 114-115.

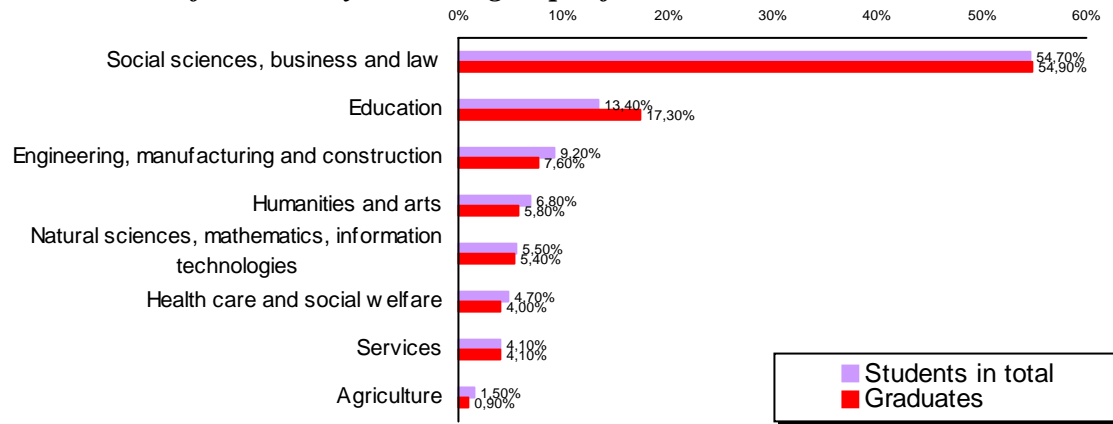
<sup>59</sup> Ministry of Education and Science (2004), op cit., p.26.

<sup>60</sup> Ibid, p.100.

<sup>61</sup> Rivza, B. (2003) "Woman in Latvian Academic Community". In: *Feministica Lettica III*, pp. 246-254. Riga: University of Latvia.

with every next step in the academic career reflecting a certain male hegemony in the academic world.

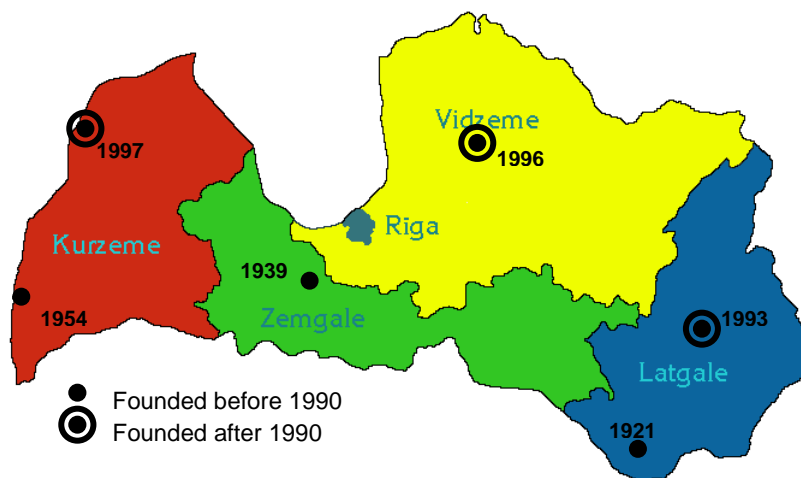
**Figure 2. Distribution of students by thematic groups of education in 2004/2005**



Source: Ministry of Education and Science (2004) *Report on higher education in Latvia in 2004 (figures, facts, trends)*. Department of Higher Education and Science. (in Latvian). p.100.

Alongside the above-mentioned universities (Latvia University of Agriculture, Daugavpils University), other major HEEs in the **regions** of Latvia are the Liepaja Academy of Pedagogy (founded in 1954), Rezekne Higher Education Institution (1993), Vidzeme University College (1996), and Ventspils University College (1997) (see Figure 3).

**Figure 3. Dislocation and foundation years of regional HEEs in Latvia**



80-85% of those undertaking studies in Liepaja, Rezekne and Daugavpils come from the respective region of Latvia.<sup>62</sup> Possibility to obtain qualification in the region of ones residence is the main benefit of the increasing number of regional HEEs thus reducing the drain of the rising generation to the capital and the overall regional disparities. With a smaller tuition fee and a rather broad spectrum of study programmes offered the regional HEEs increasingly gain their niche in the educational market.

### 3.2.2. Research system

**Research** in Latvia nowadays is mainly performed at the scientific institutes and HEEs with the majority (86.5%) of R&D personnel employed in the higher education and government sector and only 13.5% in the business enterprise sector (see Table 4).

**Table 4. R&D institutions and staff in Latvia (2000-2005)**

	Number of institutions						Number of R&D personnel (FTE)					
	2000	2001	2002	2003	2004	2005	2000	2001	2002	2003	2004	2005
<b>Higher education sector</b>	49	54	53	52	50	48	2156	2242	2226	2222 (69%)	2385 (71.8%)	2224 (67.8%)
<b>Government sector</b>	31	36	34	28	28	22	662	571	549	517 (16%)	490 (14.7%)	589 (17.9%)
<b>Business enterprise sector*</b>	193	176	228	150	225	450	996	684	676	464 (15%)	449 (13.5%)	469 (14.3%)
<b>Total</b>	<b>273</b>	<b>266</b>	<b>315</b>	<b>230</b>	<b>303</b>	<b>520</b>	<b>3814</b>	<b>3497</b>	<b>3451</b>	<b>3203</b>	<b>3324</b>	<b>3282</b>

Source: Central Statistical Bureau of Latvia (2006) *Research and Development, and Innovation Statistics*. Riga. p.27-28. (\*including private non-profit sector)

The University of Latvia, which is the oldest and largest university (~27 000 students in 2005) in Latvia hosts most of the scientific institutes (research staff at the University of Latvia in 2005 was 817, in its institutes 796)<sup>63</sup>. But there is also a number of state institutes and several ones at other universities (altogether 15 independent university research institutes and 8 state research institutes). Universities and institutes are currently the ones generating the major share of scientific publications in Latvia.<sup>64</sup>

Currently there are about 5000 PhD holders, incl. ~3,000 active **researchers** in the scientific community of Latvia, which poses a challenge to maintain a critical mass of R&D base (in 2003 only 3.2 out of 1,000 employed did scientific work in comparison to 5.6 on average in the EU). Their number has substantially decreased after 1990 and hesitates to show signs of recovery with an increased aging of academic staff and a lack of young researchers especially in the fields of natural sciences and engineering. The current age structure of the research staff in Latvia is as follows: up to 30 years – 9%, 30-39 years – 19%, 40-49 years – 23%, 50-59 years – 26%, more than 60 years – 23%. The

<sup>62</sup> Rivza, B., Viksna, D., Vitina, D., Brige, A. (2004) The role of regional higher education establishments in a balanced development of Latvia" (in Latvian). Paper presented at the international conference *Sustainable development of regional higher education establishments in the European education area*, Liepaja, Latvia, November 4.

<sup>63</sup> Muiznieks, I. (2005b), op cit.

<sup>64</sup> Kristapsons, J., Tjunina, E., Adamsonė-Fiskovica, A. (2004) *Latvian scientific publications, citation indices, patenting activity*. Riga: Centre for Science and Technology Studies of the Latvian Academy of Sciences. (in Latvian)

R&D personnel are aging and not being replaced by new, younger staff. This is true both of R&D personnel as well as university professors in scientific disciplines.

The number of newly awarded **PhDs** in the course of the last five years makes up only 370 persons (on average 75 per year) while calculations identify a need for at least 300 new PhD holders a year in order to ensure the necessary critical mass (*see Table 5*).

**Table 5. Doctorates conferred in Latvia (1995-2005)<sup>65</sup>**

	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
<i>Awarded doctoral degree</i>											
<b>Total</b>	67	93	118	174	122	21	48	52	80	79	112
<b>of which females</b>	25	38	46	73	53	11	28	33	46	49	63
<i>Average age of degree holders at the time of conferment</i>											
<b>Male&amp;females</b>	41	42	40	39	38	35	35	38	36	36.5	37.4
<b>females</b>	39	39	40	39	37	38	37	37	36	37.6	38

Source: Databases of the Latvian Academy of Sciences.

While there is a comparatively large number of students, those graduating master and doctoral programmes are only 16% and 0.5% of all the graduates respectively. However, given the new incentives and additional funding recently allocated for PhD studies the number of newly awarded doctoral degrees is expected to rise in the years to come.

With regaining its independence and integration into the EU Latvia is increasingly entering the **international arena** and not least in terms of education and research. Latvia has signed a range of international conventions (Lisbon, 1997; Salamanca, 2001) and declarations (Sorbon, 1998; Bologna, 1999) regulating this sphere. There is also a range of intergovernmental agreements on cooperation in education and R&D signed with countries both from Europe and outside its borders. The Latvian scientific community is actively participating in various international projects, incl. those in the EU 5<sup>th</sup> and 6<sup>th</sup> Framework programmes (FP). Most active in drawing up project applications for the 5<sup>th</sup> FP have been researchers from the largest universities of Latvia and the affiliated institutes (University of Latvia - 175, Riga Technical University - 84, Latvia University of Agriculture - 23, Riga Stradins University - 17) with the success rate of around 25-30%.<sup>66</sup> Another indicator of internationalisation is the high percentage of publications co-authored by scientists from other countries (55% of SCI publications).<sup>67</sup> In the course of 1997-2003 Latvian scientists had collaborative publications with scientists from almost 60 countries with the majority of those coming from Germany, Sweden, Russia, and the USA.

#### 4. The Current Latvian Debate

Most recent debates in the Parliament, various corporate forums and the academic community (in many instances conditioned by the context of drafting a range of new

<sup>65</sup> The considerable fall in the number of awarded doctoral degrees after 1999 was initially due to organisational and managerial changes and the resulting readjustments and later on due to stricter requirements for the candidates introduced with the transition from two-stage to one-stage system.

<sup>66</sup> Bundule, M., Jansons, J. (2005) "International scientific cooperation". In: *Building Knowledge Society*, Riga: Zinatne, pp. 70-92. (in Latvian)

<sup>67</sup> Kristapsons, J., Tjunina, E., Adamsone-Fiskovica, A. (2004), op cit.

policy documents mentioned in section 2.3) have focussed on the discussion of the following **key problem areas in relation to the scientific and technological development of the country** that have an important influence on the further fate and activities of the academic institutions in Latvia:

- Allocation and distribution of state funding for R&D;
- Promotion of private sector investments and involvement in R&D activities;
- Identification of priority research areas;
- Protection of intellectual property and commercialisation of research results;
- Integration of universities and research institutes.

Although specific problems are discussed mainly among the R&D community, recently R&D issues have also attracted attention of mass media and the broader public. Popular debates concentrate more generally on the challenge to develop a knowledge-based economy, in which research, education and innovation are among the main factors of competitiveness.

#### ***4.1. Government R&D funding***

During the last 15 years a persistently problematic domain for the Latvian academic institutions has been related to the provision of funding. Until 2005 practically no changes had taken place in this respect with comparatively negligible allocations for research activities being made from the state budget. A certain turn was marked by the adoption of the new *Law on Research Activity* in 2005 envisaging that “The Cabinet of Ministers, when submitting to the Parliament the annual law on state budget, allocates an annual increase of funding for research activity not lower than 0.15% of gross domestic product until the government funding for research activity reaches at least one percent of gross domestic product”. The Parliament adopted the Law unanimously presenting one of a few cases of agreement among the government and opposition parties in the Latvian Parliament. Although there were several objections from some members of the Cabinet during the debate on the aforementioned provision (e.g., in respect to the possibility to implement this provision and the deviation from the legal practice by including concrete numbers in general laws), the members the Parliamentary Committee, which prepared the Law for final approval, managed to defend their position.

Of course, one of the questions is how this political consensus on the annual increase not lower than 0.15%<sup>68</sup> was achieved. It can be explained by one major reason, namely, the determination of the public, the Parliament and the government not to be in the last place in Europe on this indicator. This determination was highlighted when the State President formed a Commission of Strategic Analysis to elaborate potential scenarios for the national development. A similar unit (sub-commission on the Future development) has been formed in the Parliament. The Minister of Science and Education of that time played an important role actively promoting the interests of science (in comparison to some former Ministers of Education and Science who saw their primary task in the solution of education problems). It is important to emphasise that the current Cabinet of Ministers is determined to fulfil its promises<sup>69</sup> despite the concerns voiced in

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<sup>68</sup> Following the example of Finland in the 1980s, the scientific community of Latvia advocated 0.1% increase for several years, while the current provision is based on more recent calculations of the Minister of Education and Science in order to reach 1% by 2010.

<sup>69</sup> This has not been the case with previous Cabinets.

respect to the capability of the Latvian education system and science, currently dealing with a range of problems, to absorb such an amount of money. Therefore now it is perceived to be largely up to the research community to provide specific tangible results aside from an increased number of students and new equipment for justifying this commitment and investments.<sup>70</sup>

#### **4.2. Problems with business R&D funding**

Despite the most recent policy developments and commitment of the Latvian government to reach the Lisbon target for public expenditure on R&D (i.e., 1% of GDP by 2010), the annual increase in the government funding would not solve problems of the overall R&D funding. The Lisbon strategy envisages that by 2010 business R&D funding should reach 2% of GDP. In order to facilitate private sector investment in R&D, the government's action plan (February 2005) envisaged not only support for state research institutes but also incentives for academic institutions and scientists to cooperate with private sector in developing technologies.<sup>71</sup>

The expanding debate on and the increasing awareness of the problems related to the promotion of this mutual cooperation and the attraction of business R&D funding both in the scientific community and the enterprise sector demonstrate the complexity of the situation. The Confederation of Industrialists deems that there are two main reasons for the weak cooperation among scientists and entrepreneurs.<sup>72</sup> On the one hand, many entrepreneurs have not expressed interest in innovations and have not made timely investments in innovative activities. On the other hand, due to the lack of resources the technical sciences were not able to provide an adequate supply. The Task force on Education, Science, Technological Development and Innovation at the Commission of Strategic Analysis has carefully pointed out that in the first few years it would not be possible to provide two thirds of increase of R&D funding from the private sector given the problems persisting in respect to co-operation of Latvian scientists with local enterprises in developing high technologies, the low innovative activity, interest and financial capacity of enterprises.<sup>73</sup> Some economists doubt whether at the moment there are any enterprises in Latvia, which would demand knowledge and expertise of Latvian scientists due to the large share of foreign owned companies.<sup>74</sup> This accordingly gives no reason to expect that these enterprises would provide any R&D funding with the Latvian industry mainly seen by those as a site for production rather than one for a strategic technological development.

On the basis of these debates some recent initiatives have started to emerge. In the state budget for 2006, 3 million lats<sup>75</sup> have been allocated for the Ministry of Economics to implement competitiveness and innovation programmes. In order to facilitate

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<sup>70</sup> Ekmanis, J. (2005) Opening Speech of the President of the Academy of Sciences at the General Meeting of Academy on 24 November 2005. - *Zinatnes Vestnesis*, December 5 (in Latvian).

<sup>71</sup> Latvia's national position paper "On Lisbon strategy" (2005) – Protocol of the Cabinet of Ministers meeting, 26.§. <http://www.mk.gov.lv/index.php/24/46/48/mkdk/protocols?protocol=838> (in Latvian)

<sup>72</sup> Zicmanis, A. (2005) "Frequent lack of concerted action". - *Dienas Bizness*, November 30 (in Latvian).

<sup>73</sup> Grens, E. (2005) The guidelines for Strategy of Science, Technological Development and Innovation. Draft. - *Zinatnes Vestnesis*, May 9 (In Latvian).

<sup>74</sup> Gulans, P. (2005) Speech at the General Meeting of the Academy of Sciences, April 14, 2005.- *Zinatnes Vestnesis*. April 26 (in Latvian).

<sup>75</sup> 1 LVL=1.423 EUR=1.721 USD (rate on 31 January 2006)

application of research results in the business sector, the Ministry has decided to allocate these funds for the creation and operation of liaison offices of technology transfer; for joint projects of entrepreneurs and scientists to conduct applied research; and for an innovation incubator programme. It is also planned to establish a Technology Agency, which in the future will coordinate the support measures for innovation and technological development at national level. Suggestions to review the tax policy and to include business co-funding for participation in the state programmes and projects in justified business expenses<sup>76</sup> as well as to review tax allowances for high technology export products and unification of income tax for all types of business activities have been voiced. Although at the moment the problem with involvement of the private sector has not been solved yet the evolving discussion has at least initiated an assessment of these issues, realisation of their topicality and the much-needed change in the mindsets of the involved parties.

#### **4.3. Priority research areas**

Another much debated issue affecting the developments in the academic community concerns the selection of priority research areas in Latvia. Since 1997, the government decree defines the priority research areas receiving additional funding through state research programmes.<sup>77</sup> Justification of these priority areas is based on the scarce resources at the disposal of the Latvian government inhibiting the development of extensive scientific projects and applied research in all research areas and implying the necessity to select a limited number of basic technologies for receiving the state support in education, scientific research and innovation.<sup>78</sup>

Traditionally, the Ministry of Education and Science together with a small working group of scientists prepared a draft decree on the priority research areas, which was not openly discussed in the scientific community. But in 2005 comparatively more discussions on these priority areas, which were intensified by the additional government funding allocated for academic institutions, took place.<sup>79</sup> The main discussion evolved around the potential shift in the proportions of funding distributed among the different research branches, which were decided in 1990-1991 and have not been significantly changed so far. While, on the one hand, it was noted that this change should happen in a balanced manner with the provision of opportunities to develop new sub-fields, others insisted on the need for a balanced development of research fields only with established traditions and scientists. Radical opinions altogether denying the necessity of priority areas have also been expressed. This position has been based on the assumption that Latvia will never be able to produce world-class knowledge even in priority areas, as the risk that other countries will surpass is very high. The issue of priority areas has also been linked to the development of science in the regions. Since currently scientific activities are highly concentrated in the capital city a strong necessity to elaborate regional development policy of Latvia that would promote the development of science in the

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<sup>76</sup> Grens, E. (2005), op cit.

<sup>77</sup> On 30 May 2006 the Cabinet of Ministers approved nine thematic priorities for funding basic and applied research for 2006-2009: agro-biotechnology, biomedicine and pharmacy, energy, information technologies, Latvian studies, material science, forestry, health and environmental science.

<sup>78</sup> Grens, E. (2005), op cit.; Zicmanis, A. (2005), op cit.

<sup>79</sup> Overview of the range of views based on the materials of scientific conference "Latvian science in development" (27 May 2005) published in *Zinatnes Vestnesis*, June 6, 2005 (In Latvian).

regions is being stressed. A certain solution to this problem is seen in the introduction of regional coefficients in the distribution of research funding providing an opportunity to develop the prerequisite infrastructure, increase the level of salaries and correspondingly the attractiveness of work in the regional centres of science.

#### **4.4. Protection and commercialisation of intellectual property**

A fundamental problem is the protection of intellectual property and the related commercialisation of research results. While in the late 1980ties under the conditions of a soviet socialist economy up to 1000 inventions were annually registered in Latvia thus being indicative of the country's notable inventive potential, nowadays the scene has changed drastically with only 100 to 150 patent applications a year.<sup>80</sup> Currently not all inventions are being processed as patent applications by Latvian scientists. Instead they are often sold to foreign partners simply as know-how. In many cases an interested foreign company turns up, undertakes all the patenting issues and subsequently gains the ownership over the particular invention. As acknowledged by the draft *Guidelines for Strategy of Science, Technological Development and Innovation*, the insufficient experience and resources possessed by Latvian scientists necessary for the legal protection of their intellectual property in Europe and worldwide poses a serious threat to the anticipated economic output of R&D investments.<sup>81</sup> Besides, in many instances Latvian scientists and inventors cannot afford patenting due to mere financial reasons thus leading to the situation that several substantial inventions are not being patented even in Latvia. The insufficiently active and inefficient commercialisation of undertaken research is also being related to the inadequate remuneration of the staff for the intellectual values created.<sup>82</sup>

According to the views voiced by scientists<sup>83</sup>, the problem solutions should focus on the financial support from the state for patenting abroad along with the necessity for maximal efforts in motivating scientists to develop patentable solutions. However, there are diverse opinions in respect to the latter. For example, the Development strategy of the University of Latvia envisages the creation and implementation of intellectual property as one of the tasks of its academic staff, in case of success ensuring their eligibility to a certain share of income generated by the exploitation of this property. It seems that such a formulation is useful in the case of well-developed and elaborated practices of patenting and commercialisation but not of those in a very initial stage of development. On other occasions it has been noted that an inventor should receive at least 50% of the given income from the exploitation of his/her intellectual property. Also individual scientists<sup>84</sup> think that for the time being it is important to demonstrate the growth potential in applied science – in case money is earned it can be added to ones project without any excessive bureaucratic procedures.

It is being noted that various support models, incl. direct support to SMEs for the development of innovative products and processes actively promoted in the EU countries

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<sup>80</sup> Kristapsons, J., Tjunina, E., Adamsons-Fiskovica, A. (2004), op cit.

<sup>81</sup> Grens, E. (2005), op cit.

<sup>82</sup> University of Latvia (2004) *Development Strategy of the University of Latvia*. Riga.

<sup>83</sup> Talberga, I. (2005) Account of the meeting organised by the Latvian Academy of Sciences in February 2005. - *Latvijas Vestnesis*, February 9 (in Latvian).

<sup>84</sup> Zemitis, A. (2005) Materials of the scientific conference "Latvian science in development" (27 May 2005). - *Zinatnes Vestnesis*, June 6 (in Latvian).

should be implemented with caution in Latvia by estimating the resources of the particular company.<sup>85</sup> Under the conditions present in Latvia one has to take into account the currently rather successful practice developed by the largest research institutes when they simultaneously undertake several complementary activities – developing fundamental science, carrying out applied research, providing technological services as well as establishing small spin-off companies. An artificial separation of these activities according to formal principles would break the link between science and innovation.

As to the most recent developments in respect to the addressed issue one could mention the governmental support for the establishment of liaison offices of technology transfer at the academic institutions – both universities and research institutes – of Latvia launched in the end of 2005. Though coming with a delay of some 5 or 10 years in the view of industrial representatives<sup>86</sup> this initiative addresses the longstanding problems related to the provision of scientific services to entrepreneurs as well as the training of engineering specialists. In addition, the government has established the Intellectual property board affiliated to the Patent Office of the Republic of Latvia and charged with the task of coordinating and promoting the protection of intellectual property rights in the country.<sup>87</sup> This step has been largely conditioned by the lack of a single, coordinated mechanism in the field of intellectual property right protection in Latvia with a range of institutions involved in the process so far.

On the whole, given the premise brought forward by the president of the Latvian Academy of Sciences Juris Ekmanis that the solution of problems related to the intellectual property and the commercialisation of research results is a complex one involving legislation, finances and especially a change in the state attitude towards these issues<sup>88</sup>, one can observe a certain move recently launched in this direction in Latvia.

#### ***4.5. Status and role of the scientific institutes in the Latvian R&D system***

Intensive discussions in the scientific and academic community during the last years have been focused on the status and the role of research institutes in the Latvian R&D system with many thematic meetings held between institute directors, representatives of the Ministry of Education and Science, the Academy of Sciences, university senates and special commissions, the Union of Scientists and trade unions, etc. These debates have been largely conditioned by the following conflicting motives:

- The university intention to integrate the formerly legally independent institutes thus acquiring an additional strong research potential, and to prospectively turn into a research-type university (following the foreign pattern);
- The institutes' intention to keep their legal independence thus keeping the flexibility in choosing their research subjects and managing the financial resources;
- The subjective considerations on behalf of the institute directors and the leading scientists having to do with the unwillingness to lose their existing administrative status.

These discussions evolved in response to the new Commercial Law that came into force in 2004 and included no special provision on the position of research institutes

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<sup>85</sup> Grens, E. (2005), op cit.

<sup>86</sup> Zicmanis, A. (2005), op cit.

<sup>87</sup> Provision on the Intellectual property board (2006) - *Latvijas Vestnesis*, January 17 (in Latvian)

<sup>88</sup> Talberga, I. (2005), op cit.

which lead to the situation that institutes had to register themselves like all the other public and private commercial bodies. In its turn the new Law on Research Activity that was elaborated in 2005 included the term of the “agency” (thus relating the new law with the Commercial Law) and came along with the intention of the ministry to enforce this reorganisation as soon as possible, within half a year.

There are also different conceptual approaches taken by universities and research institutes to these organisational issues. According to the rector of the University of Latvia<sup>89</sup>, the concept of the isolation of science and university characteristic of the last century is still very live in the minds of people and also the press. Although this separation was not as typical in Latvia as in many other places in the former Soviet Union, it was still considered that the university is exclusively aimed at teaching while science is performed at the institutes of the Academy of Sciences. This division was not only established in the minds of people, but also in the salary system and as such this notion still persists. The Development strategy of the University of Latvia<sup>90</sup> recognises that the University of Latvia still features the division between the structural units of studies and those of research – a trend atypical of the European universities. This strategy envisages an encouragement of both the existence of institutes alongside faculties and the incorporation of institutes as structural units within the faculties. According to this conception, the research institutes not being the basic structural units of the university cooperate with the university and take advantage of its name based on a contractual basis taking into account the academic traditions. In its turn, the draft Development strategy of the Latvian science<sup>91</sup> includes a statement envisaging an integration of research institutes corresponding to the activities of universities into the structure thereof in line with the new Law on Research Activity simultaneously ensuring the position, the organisational structure and the autonomy of institutes in the university constitution.

It might be essential to stress that the integration of institutes into the University of Latvia taken up so enthusiastically in 1996 has not turned out as intended.<sup>92</sup> In the course of time social contradictions have emerged with the University professors whose salaries are currently being considerably higher than those of researchers thus providing no stimulus to share with the latter and involve them in the academic work. Given the fact of the institutes being under the wing of the University their serious integration and involvement in the study process was presumed. However, not all are being given this possibility due to the existence of a range of branches represented by the respective university departments with full faculty and no need for an external assistance (except in cases of giving some very specific lectures) providing no solution to the financial problems of those working at the research institutes. Given this situation it is being increasingly stressed that such an opposition between the institute researchers and the university faculty is inadmissible.

Taking an overall view on the relations between universities and institutes leads to conclude that the contradictions in this respect have persisted the whole period of the last 15 years following the reforms of the funding and management system of science in

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<sup>89</sup> Lacis, I. (2005) “Science can not be understood. It must be accepted.” – *Nedela*, December 12 (in Latvian)

<sup>90</sup> University of Latvia (2004), op cit.

<sup>91</sup> Grens, E. (2005), op cit.

<sup>92</sup> Viksne, J. (2005) “Reflections at the crossroads”. - *Zinatnes Vestnesis*, March 7 (in Latvian).

1990. Since science funding was distributed by the Council of Science according to the level of research (on the whole being higher in the institutes), universities received a relatively small share of these financial resources. At present the largest share of the increased state funding for science has been allocated for the development of science at the universities thus bypassing the expertise system of the Council of Science. This in turn implies an expanding influence of universities in the field of science and a simultaneously diminishing role of the Council of Science elected by the scientists themselves which was often seen as an example of a pronounced democracy in the field of science management among the East European countries.

Change in the distribution mechanism of science funding has one essential peculiarity. While formerly all the state funding for science was distributed via a competition of submitted project applications with practically no involvement of institutes and universities in the assignation procedure, under the new system the major part of the state funding goes directly through the academic institutions with a certain share of funding allocated to applied research projects prospectively leading to new technologies and materials.

## Conclusions

On the whole, Latvia has experienced a rather considerable change in the role and the functions of the academic institutions when making the overall transfer from the soviet-type science and technology system to the national innovation system with many related issues still to be addressed in the coming future. The currently forming national innovation system in Latvia has to evolve and the academic institutions have to operate within the context of a transition economy and a new EU Member State, which aims at catching-up with the developed countries. Despite the high economic growth rates in recent years, the prospects of long-term economic development face many challenges, incl. a weak enterprise sector, regional disparities, a negative trade balance, a weak industry dominated by low- and medium-tech sectors, etc. Nevertheless, the developments of the recent years in terms of new legislative acts, policy documents and measures characterised by an increasing value attached to the role of education and science rather than cheap labour force as the basis of the country's competitiveness point to a certain turn in the overall development of Latvia. The chosen model of a knowledge-based development based on education, science, technological development and innovation sets these as prior preconditions for a successful and sustainable development of the country.

In order to implement this strategic vision the **principal challenges** to be addressed in regard to the overall knowledge-production system in Latvia are related to the level of R&D expenditures and especially the respective share coming from the private sector. Although substantial progress has been made by the adoption of the new legislative norm providing an annual increase in GERD as well as additional allocations from the state budget and structural funds through various state support programmes the attraction of complementary funding from the enterprise sector is still an unresolved issue. This has largely to do with the weak business involvement in the innovative activities and the underdeveloped collaboration models with potential partners both from industry and the academic circles. Although various policy documents increasingly stress

the stimulation of cooperation between the academic research and the private sector in the field of new technology development, additional efficient measures have to be sought. Underdeveloped linkages and co-operation can also be observed between other stakeholders of the NIS as well, incl. various governmental and non-governmental bodies.

More specifically the **main challenges for the academic institutions** in Latvia are related to the integration of scientific and entrepreneurial activities in respect to the development of an overall entrepreneurial culture within the research community and building competence in transferring and commercialising the produced knowledge. Another aspect of integration has to do with that between studies and research, which is largely embodied in the still problematic relations between HEEs and research institutes. Finally, it's also about a further integration into the European Research Area and the international academic community in general. Aside from that the future development is currently threatened by the limited inflow of younger generation replacing the drastically aging academic staff among other things hindered by the non-competitive salary system as well as the decreasing interest of students in undertaking exact and technical as well as PhD studies in general. It's also about balancing the financial constraints of HEEs with the quality of training offered. Challenges exist in respect to upgrading both the physical infrastructure of the academic institutions as well as the human resources.

On the whole, the science of Latvia currently seems to be entering a **new phase of development** marked by the adoption of the new Law on Research Activity, the increase in science funding and a targeted shifting of these resources towards particular aims thus marking new priorities, new conditions and new directions in the science organisation in Latvia. The academic institutions either take advantage of the new circumstances, are forced to adapt to those or look for their own niche. Beyond doubt the major winner today is the university system receiving the major share of additional funding allocations being motivated by the necessity of uniting studies and research activities - a slogan put forward ever since 1990 with rather unsuccessful attempts to implement it so far only by the way of administrative methods.

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